Space data for Healthcare

EUSPA, Market Development

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A new EU Space Programme

EU space activities under one umbrella

EGNOS
EGNOS “Makes navigation signals more accurate and trustable for Safety-critical applications”
Operational in 400+ airports & helipads in 23 countries

Galileo
Global satellite navigation and positioning system (GNSS)
More than 3 billion Galileo receivers worldwide

Copernicus
Earth Observation (EO), monitoring based on satellite & non-space data
Nr.1 world provider of space data and information (>20TB/day)

GOVSATCOM
Secure satellite communications for EU governmental actors
Rapid support over crisis areas

Others
Space Situational Awareness (SSA/SST)
Access to Space
Galileo and EGNOS: European success story enabling new business across different market segments

- 3+ billion Galileo-enabled smartphones
- 55 car brands selling 150+ EGNOS & Galileo-enabled models
- Over 158 drone receiver models from 35 manufacturers with EGNOS and/or Galileo
- 420+ EGNOS enabled airports and 800+ EGNOS based approach procedures in 23 EU countries
- 37% Galileo and 90% EGNOS OS penetration in receiver models
- First ELT, EPIRB and PLB with Galileo Return Link in the market in 2020

- E-GNSS in more than 150,000 railway wagons in EU
- 97% of new tractors in Europe using GNSS to optimize agriculture
- Over 2 million GNSS-enabled T&S devices installed worldwide in 2020
- EGNOS integrated in all mapping devices & Galileo in 80% of receivers for surveying
- More than 3,700 satellites rely on GNSS to navigate in space
The EU space programme contributes to public health: Value added brought by Galileo

From emergency caller location to the monitoring of elderly patients, Galileo has a substantial impact on our health and safety.

Galileo supports the development of telemedicine, medical transport (UAVs) and guidance for the visually and physically impaired.

GNSS-enabled applications such as fitness trackers and wellbeing smartphone applications are already a natural part of a healthier lifestyle for many citizens.
The EU space programme contributes to public health: Value added brought by Copernicus

**Copernicus** monitors health-related environmental phenomena by supplying information such as *air quality forecasts* and *UV forecasts*.

Copernicus can also help identify areas prone to the *emergence* and *spread of epidemics*, which depend on environmental factors such as *water, sanitation, food and air quality*.
There are various data available for healthcare segment

**Atmospheric data**
- Air temperature
- Humidity
- Wind speed and direction
- Birch Pollen
- Solar radiation
- Natural emissions
- Greenhouse gas

**Ocean data**
- Temperature
- Colour
- Wave height
- Surface wind
- Salinity
- Algeas

**Water bodies**
- Extend
- Water temperature
- Colour, reflectance
- Algeas
- Water colour
- Water level for lakes

**Terrestrial**
- Landuse, Landcover
- Land temperature
- Soil Moisture
- Fire disturbance
- Vegetation status
Copernicus, previously known as GMES (Global Monitoring for Environment and Security), is the European Programme for the establishment of a European capacity for Earth Observation.
CAMS services:

- Added value products, indicators
- Models
- Archives, Near real Time and Forecasting products
Space data has become part of our healthy life

Earth observation (EO) helps to fight **vector-born diseases**, thereby support **prevention, early warning** and **health-care planning**

EO contribute to monitor **environmental pollution and risks** including **heatwave risks**

EO became part of **personal application and wearables**
Space data contributes to different application areas in healthcare
Vector-born diseases

EYWA (EarLy WArning System for Mosquito borne diseases)

- lies under the umbrella of EuroGEO Action Group "Earth Observation for Epidemics of Vector-borne Diseases"
- a prototype system addressing the critical public health need for prevention and protection against the Mosquito-Borne Diseases (MBDs)
- The system combines interdisciplinary scientific fields (entomology, epidemiology, ecology, EO, Big Data Analytics, AI/ML, Ensemble Dynamic/Hybrid vs Data Driven models, Data Fusion and Citizen sciences) towards building new directions in applied research and innovative services for public health, such as outbreak forecasting and decision support modeling for vector control applications and other mitigation actions.

- 1st EIC Horizon Prize on Early warning for Epidemics

Vector-born diseases

- dynamic and data driven models, learning about the dynamics of mosquitoes
- abundance and mosquito-borne disease transmission
- provide monthly, weekly and daily predictions
Vector-born diseases

Aim of the project is to develop an innovative, scalable and accurate process to produce **West Nile Disease (WND) risk maps**, using EO data and specific AI algorithms.

- West Nile virus (WNV) infection is one of the most widespread mosquito-borne zoonosis in Italy and Europe. Its transmission cycle is well understood, whilst identifying suitable environmental conditions across large areas containing multitude species of potential hosts and vectors can be difficult.
Vector diseases

AIDEO
• The goal is to connect the power of Artificial Intelligence (AI) to Earth Observation (EO) data to explore hidden patterns and to assess the potential of automated processes in making accurate predictions of the spatio-temporal re-emergence and spread of the disease in Italy.
• AIDEO aims to develop an innovative, scalable and accurate process to produce West Nile Disease (WND) risk maps, using EO data and specific AI algorithms.
Fighting diseases like Dengue, Zika and Chikungunya

DIPTERON is a Start-up founded in January 2018 with the goal of providing an application for detecting Aedes mosquito risk areas.

https://dipteron.com/

The early identification of vulnerable areas is crucial to control the advancement of diseases. DIPTERON application can detect such risk areas based on artificial intelligence that combines satellite and ground data with a prediction model of 4 weeks in advance for Aedes outbreaks.

Copernicus data: NASA MODIS, Landsat and Sentinel-1, -2 and 3
Environmental pollution and risks

Finding Plastic Patches in Coastal Waters using Optical Satellite Data

- **Satellites optical data** offer a unique perspective to observe the problem of **plastic litter in the marine environment**, but few studies have successfully demonstrated their use for this purpose.

- **Patches of floating macroplastics are detectable** in optical data acquired by the European Space Agency (ESA) **Sentinel-2** satellites and, furthermore, are **distinguishable** from naturally occurring materials such as seaweed.

https://www.nature.com/articles/s41598-020-62298-z
Environmental pollution and risks

Finding Plastic Patches in Coastal Waters using Optical Satellite Data

- Patches of materials on the ocean surface were highlighted using a novel Floating Debris Index (FDI).
- In all cases, floating aggregations were detectable on sub-pixel scales, and appeared to be composed of a mix of seaweed, sea foam, and macroplastics.
- Suspected plastics were successfully classified as plastics with an accuracy of 86%.
Environmental pollution and risks

S-3 EUROHUB

- Harmful Algal Blooms (HABs) are caused by excessive growth of marine algae which release harmful toxins into the water that can kill fish, shellfish and even humans when they consume contaminated fish.
- As a result they can have an extremely damaging effect on the tourism and fishing industries.
- The project use S-3 satellite data to create a web based HAB and water quality alert system that will be designed for marine managers and industry end users to enhance the marine monitoring of HAB’s in the French-English Channel region.

http://www.s3eurohab.eu
Environmental pollution and risks

S-3 EUROHAB has produced a web based alert system for a selection of the most important Harmful Algal Bloom Species. Currently the system provides data covering:

- Karenia - responsible for reducing oxygen in the water column
- Phaeocystis - responsible for producing foam
- Pseudo-nitzschia - responsible for Amnesic Shellfish Poisoning

Images in the portal are provided in near real time so data up to a few days ago should be available.

https://www.s3eurohab.eu/
Heatwaves

HeatwAve

This application allows users to explore the number of heat waves in European countries based

- A **heatwave is a prolonged period of high temperature, relative to the region.** A number of qualifying definitions of heat waves are used in the climate and health communities. This application, and underlying dataset, presents the following heat-wave definitions

- **The time-slider allows users to see how the number of heat wave days has changed from 1979 to 2022.** The interactive map data has been averaged on to the NUTS level 3 administrative regions. By clicking on a country or region it is possible to view time-series of the number of heat wave days for that country/region. Zoom in/out to click on smaller/larger regions.

https://business.esa.int/projects/heatwaive
URBAN HEATWAVES: ANALYSIS OF THE IMPACTS ON THE POPULATION USING SATELLITE DATA

- analyzing the phenomenon of urban heat islands UHI
- analyzing the relationship between temperature and drought in the agricultural areas of the Metropolitan City of Milan exploiting satellite remote sensing technologies

Air pollution

**EO-based pollution-health risks profiling in the urban environment**

‘Health Surveillance Air Quality’ Pilot (HSAQ), Earth observations for AQ (e.g. in situ monitoring stations, satellite retrievals, atmospheric numerical models, citizen observatories) are fused with population and health data towards tailored, added value products that support public air quality and health assessments, informed decision making as well as urban planning. **In particular:**

**An Aggregated Risk Index for pollution impacts on health** for several megacities of the UNESCO list.

**Satellite-based observations are converted into NO₂ surface concentrations** to support for the first time the national AQ assessment of Finland delivered to the European Environmental Agency (EEA).

**Health risk due to exposure to air pollutant mixture (PM₂.₅, PM₁₀, NO₂, O₃, SO₂) is assessed for Munich (at the zip postal level) and other megacities of the globe.**

**High resolution, population weighted PM₂.₅ concentration levels** are assessed for the city of Bari.

**Dynamic mapping of population exposure to air pollution is estimated**, with emphasis on the exposure for NO₂ and PM₂.₅ in Athens.
Air pollution

An Aggregated Risk Index for pollution impacts on health is calculated, based on satellite data, for several megacities of the UNESCO list.

/ Key Datasets
EO and Copernicus Services: NO2 Sentinel-5P, GHSL distribution of population, World Settlement Footprint, CAMS regional and global re-analysis products for AQ, European anthropogenic emission database CAMS-REG, ERA5 meteorological data at ECMWF,
In-situ, citizen observatories: E-PRTR database of stationary emission sources, national regulatory monitoring networks of AQ (Greece, Finland, Germany), National RI PANACEA network of sensors (https://air-quality.gr/)
Numerical modeling datasets/services: POLYPHEMUS model product, GEOS-CHEM global AQ model predictions, EPISODE-CityChem CTM outputs
m-Health applications benefiting from Copernicus

**DiscovAir: keeps residents and visitors in Greece and Cyprus**

It recommends an **optimal time** to visit any given **location**, based on its **air quality**, **UV index**, **pollen**, and **temperature**.

Copernicus data: CAMS

**Pasyfo: Personal Allergy Symptom Forecasting System**

Allergy symptoms forecast build especially for you

Possibility to compare your allergic complaints with the concentrations of pollen in the air

Copernicus data: CAMS
UV-Bodyguard: Warns you before you get sunburned

It measures UV radiation, sends the data to your smartphone and warns you on time

Copernicus data: Sentinel-5p and UV forecast of the CAMS
Galileo for Personal Applications & Wearables

Oculus Tracker: the world's first 25HZ GPS tracker for alpine ski racers

Using GNSS high precision to provide detailed analysis of your performance directly on your smartphone, tablet or PC

Follow-Me by RunBlind: precision guidance solution based on sound augmented reality

Accurate & reliable positioning is the key enabler of a trustable and easy-to-use product dedicated to visually impaired peoples’ outdoor activities
EUSPA Market Report presents GNSS and EO market trends and applications

• The EO and GNSS Market Report combines the market and application insights into a single report that provides global coverage of the EO and GNSS applications across multiple market segments

• Selected market segments relevant to health

Get your free copy:
Consumer solutions dominate all other market segments in terms of cumulative revenue.

**Cumulative revenue by segment 2021–2031**

- **Total:** €3,860 bn
  - Consumer Solutions, Tourism & Health: 61.0%
  - Road & Automotive: 29.2%
  - Other: 9.8%
- **Total:** €377 bn
  - Urban Development and Cultural Heritage: 2.9%
  - Emergency Management and Humanitarian aid: 0.1%
  - Maritime and Inland Waterways: 0.4%
  - Fisheries and Aquaculture: 0.1%
  - Infrastructure: 1.6%
  - Other segments: 0.1%
  - Agriculture: 3.8%
  - Hail: 0.3%
  - Aviation and Drones: 0.6%

*Other segments includes Space, Forestry, Insurance and Finance, Energy and Raw Materials*
The shipment of sports & wearables saw an annual increase of 30% between 2015 and 2020.
EO-based climate modelling holds by far the largest market share in the segment, with the other applications.
EUSPA funding tools stimulating innovation and fostering EU aerospace ecosystem, incl. start-ups & SMEs

### CASSINI and Entrepreneurship
Foster EU’s innovative spirit to deliver applications and services
Stimulate innovation and entrepreneurship in the aerospace ecosystem

### Horizon Europe
Foster adoption of Galileo, EGNOS and Copernicus via application development
Support the integration of services into devices and their commercialisation

### Galileo/EGNOS research (Fundamental Elements)
Foster the development of innovative Galileo and EGNOS-enabled receivers, antennas and chipsets
Increase EU industry competitiveness

### Adoption grants
Foster EGNOS operational implementation for civil aviation
Maximise EGNOS adoption all over EU
Support for start-ups under Cassini – the EU programme

www.cassini.eu

Develop your solution

- Hackathons
- Competitions
- Development Programme
- Connection to accelerators/incubators

Get advice

- Technical advice
- Business advice

Get funding

- Very early stage – EBAN, crowdfunding
- Venture capitals
- EIC Accelerator
- Horizon Europe, Fundamental Elements
- European Investment Bank
- Investor matchmaking

Get connected

- Contacts with industry
- Networking events
- Dedicated promotion
New myEUspace competition just launched as part of CASSINI

Do you have...

- a theoretical idea with a high market potential?
- a prototype that you want to bring in the market?
- a product and you want to scale-up your business?

Are you...

- an entrepreneur, start-up, scale-up or university student coming from EU Member States, Norway, Switzerland or Iceland?

Apply now!

We are looking for the best commercial solutions (mobile apps, wearables, robotics etc.) using EU space data and their synergies.

Learn more about the competition and the timeline here: https://www.euspa.europa.eu/myeuspacecompetition

€ 1.000.000 PRIZE POOL

30 AWARDS
EUSPA Space Academy: Lift off to a successful space business


EU space data and signals
Team & resources
Product
Business
Customer & sales
Finance

Free of charge training & mentoring
You can join anytime!
https://www.euspa.europa.eu/spaceacademy/

Trainings
Workshops
1-to-1 mentoring
Office Hours
EUSPA Horizon Europe call of 2022 (HORIZON-EUSPA-2022-SPACE)

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<tr>
<th>Type of Action</th>
<th>Topic</th>
<th>Indicative budget (EUR mln)</th>
<th>Funding rate</th>
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</thead>
<tbody>
<tr>
<td>IA</td>
<td>EGNSS applications for Smart mobility</td>
<td>9.5</td>
<td>70% (except for non-profit legal entities, where a rate of 100% applies)</td>
</tr>
<tr>
<td>PCP</td>
<td>Public sector as Galileo and/or Copernicus user</td>
<td>5.2</td>
<td>100%</td>
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<tr>
<td>IA</td>
<td>Copernicus downstream applications and the European Data Economy</td>
<td>9.6</td>
<td>70% (except for non-profit legal entities, where a rate of 100% applies)</td>
</tr>
<tr>
<td>RIA</td>
<td>Large-scale Copernicus data uptake with AI and HPC</td>
<td>9.6</td>
<td>100%</td>
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<tr>
<td>RIA</td>
<td>Designing space-based downstream applications with international partners</td>
<td>5.1</td>
<td>100%</td>
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<tr>
<td>RIA</td>
<td>GOVSATCOM Service developments and demonstrations</td>
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<td>100%</td>
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<tr>
<td>TOTAL budget:</td>
<td></td>
<td>48.1</td>
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* dates are tentative and subject to change
The UCP is engaging with other user communities, industries, service providers and R&D, bringing together expertise and insights from different applications, sharing experiences, and strengthening an EU network of innovators by encouraging cooperation across broad disciplines.

Outcomes of the UCP are used to compile and update a series of Reports on User Needs and Requirements per market segment and address priorities for future R&D programs.
Time for discussion and Q&A
The European Union Agency for the Space Programme is hiring!

Apply today and help shape the future of #EUSpace!